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REMARKS

With this amendment, claims 1-71 are currently pending in the application. Claims 28, 34, 36, 37, 44, 47-48, 56, and 66 have been amended to address the Examiner's rejections. New claims 68-71 have been added to accommodate the amended claims. Support for these new claims may be found in claims 28 and 44 as originally presented, and in claim 32. No new matter has been added.

I. OBJECTIONS TO CLAIMS

The Office Action objected to claims 1-31, 39-43, and 66-67 because

"the relationship of the 'interface' to the 'human tissue in vivo' and/or the 'acoustically coupling (step)' should be clarified since it is subject to diverse interpretations if the interface is construed as unrelated to tissue."

The Applicants respectfully refer the Examiner to page 4, lines 15-23 and page 10, lines 13-22, of the application. "[T]he first medium may correspond with the modal converter or soft tissue, depending on the intervening interface being described. When the first medium corresponds to the modal converter, the second medium corresponds to soft tissue. . . . When the first medium corresponds to soft tissue, the second medium corresponds to bone tissue." (page 4, lines 15-23). The "interface", therefore refers to a change of medium through which an ultrasonic wave propagates, at least one of the media at the interface being a type of human tissue.

Accordingly, reading the claims in light of the specification to resolve any perceived ambiguities leads to the conclusion that the interface should not be construed as unrelated to tissue. As a result, there are not diverse interpretations of the meaning of the claim language as suggested by the Examiner. The Applicants respectfully submit that the objected-to independent claims and their depending claims are now in condition for allowance and request withdrawal of the objections.

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II. REJECTIONS UNDER 35 U.S.C. § 102

The Office Action has rejected claims 28-30, 32-33, 35, 37-38, and 44 under 37 C.F.R. § 102(b) as being anticipated by Figure 7 of U.S. Patent No. 5,856,622 to Yamamoto et al. (*Yamamoto*), by Figures 1 and 2 of U.S. Patent No. 4,680,967 to Rost (*Rost*), by Figures 1 and 5 of U.S. Patent No. 4,570,487 to Gruber (*Gruber*), or by Figures 2 and 6-7 of U.S. Patent No. 4,467,659 to Baumoel (*Baumoel*) and Figures 8 and 9 of U.S. Patent No. 4,195,517 to Kalinoski (*Kalinoski*). These rejections are respectfully traversed as follows.

A. The *Yamamoto* Reference

The Office Action stated,

“the refractive wedge devices which in [*Yamamoto*] act as a measurement pair and have two top surfaces and side surfaces with two transducers mounted thereon such that mode conversion would be possible dependent on an unspecified material forming the test interface, these would suffice to anticipate the claimed structure.”

Independent claims 28 and 44 have been amended to include the limitation that transducers are acoustically coupled to the top surface, and that an acoustic transducer is either coupled or is capable of being coupled to at least one of the side surfaces. *Yamamoto* does not disclose an ultrasound transducer acoustically coupled to an analogous top surface, or the possibility that at least one ultrasound transducer may be acoustically coupled to both the top surface and at least one of the side, angled surfaces. The Applicants respectfully submit that this element of the amended claim is not taught or disclosed in *Yamamoto*, therefore the rejection is improper and Applicants request that it be withdrawn.

B. The *Rost* Reference

The Office Action states that, in *Rost*,

“the respective transducers [are] mounted at different angles with respect to the bottom surface and along the side of their respective wedges[.]”

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The Applicants respectfully reiterate the amendments discussed above with regard to claims 28 and 44. Claims 28 and 44 have been amended to recite that the top surface is parallel to the bottom surface. Figures 1 and 2 of *Rost* teach a wedge, wherein a top surface and bottom surface are offset from one another by the angle of the wedge. *Rost* does not teach top and bottom surfaces parallel to each other and at least one side surface disposed at an angle to the bottom surface. *Rost* does not teach each of the limitations of the claims as amended, therefore it is not an anticipatory reference. The Applicants respectfully request that the rejection be withdrawn.

C. The *Gruber* Reference

The Office Action stated that, in *Gruber*,

“[the figures] may be considered the topmost surfaces and the transducer pairs nested at differing angles along side surfaces with respect to the bottom.”

The Applicants respectfully assert that the arguments with respect to the *Yamamoto* reference as stated above also apply to the *Gruber* reference. *Gruber* does not teach an ultrasound transducer acoustically connected to an analogous top surface, or two or more ultrasound transducers acoustically coupled to each of the top surface and at least one of the side, angled surfaces, as stated in the amended claims. Instead, *Gruber* shows two transducers on top surfaces at angles to each other and to the bottom surface. Therefore, *Gruber* does not anticipate the claims as amended. The Applicants respectfully request that the rejection be withdrawn.

D. The *Baumoel* Reference

The Office Action stated that, in *Baumoel*,

“... the mode converter includes a transducer nested into side surfaces with respect to the bottom surface and below the top surface thereof.”

The Applicants respectfully assert that Figure 5 of *Baumoel* does not teach or disclose the limitations of the amended claims as discussed above with regard to *Yamamoto* and *Rost*. Figure 5 of *Baumoel* does not disclose a top and bottom surface parallel to

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each other or parallel to the surface of a human tissue interface. *Baumoel* also does not teach a transducer mounted in such a top surface and also in at least one side surface.

Claim 56 has also been rejected under *Baumoel*. The Office Action stated that *Baumoel* teaches a top surface at angles to the bottom surface and only a single transducer in each apparatus.

“ . . . [the reference] teaches the inset of an acoustic transducer within a trapezoidal mode conversion wedge block. Again the intended use is accorded no patentable weight nor is the critical angle relationship since neither the interface material nor the insonation frequency are specified.

Claim 56 has been amended to include the limitations of a top surface capable of receiving an ultrasonic transducer and a bottom surface parallel to the top surface. None of these limitations are taught by or disclosed in Figure 5 of *Baumoel*. Additionally, it is respectfully submitted that the Examiner may not ignore the angle limitation as recited. Although the Applicants do not recite the type of interface or the specific frequency, the Examiner must still give effect to each and every claimed limitation, and if a limitation is not included in the references cited, the invention is not anticipated. Therefore, *Baumoel* does not anticipate the claims as amended. The Applicants respectfully request that the rejections under *Baumoel* be withdrawn and submits that the claims are now in condition for allowance.

E. The *Kalinowski* Reference

The Office Action rejected claims 44-46 as anticipated by

“[*Kalinowski*] evidences that, if applicants' intended use be accorded no patentable weight under the plural interpretation for 'at least one transducer', mode conversion block assemblies heretofore included plural angulated side surfaces together with top and bottom surfaces and plural transducers mounted thereon; if applicants' critical angle feature be accorded no patentable weight since the material of the interface and the frequency of the insonation is unrecited. In the alternative, it is argued that the transducer set could function as claimed

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depending upon selection of a suitable interface material. Additionally, the Figure 7 paired embodiment may be argued to be trapezoidal (in the sense of general outline) or could be made trapezoidal as an obvious variant since the recessed surface may be adjusted and reflects the merging of the separate trapezoidal blocks of Figure 8.”

The Applicants respectfully submit that *Kalinowski* does not anticipate the claims as amended. *Kalinowski* does not teach at least one ultrasonic transducer acoustically coupled to a top surface and at least one ultrasonic transducer also coupled to at least one side surface as stated in the amended claims. In Figure 7, *Kalinowski* shows multiple transducers on the “top” surface of an apparatus to hold the transducers, each on an opposite side of the pipe. Figure 8 of *Kalinowski* shows two separate transducers at angles to the bottom surface, but on two separate apparatus. Figure 9 shows two transducers at angles to the bottom surface and on one apparatus, but no transducers acoustically coupled to the top surface. Therefore, since these figures of *Kalinowski* do not show each and every limitation as recited in the claims, the reference does not anticipate the claims. Additionally, it is respectfully submitted that the Examiner may not ignore the angle limitation as recited. Although the Applicants do not recite the type of interface or the specific frequency, the Examiner must still give effect to each and every claimed limitation, and if a limitation is not included in the references cited, the invention is not anticipated. The Applicants respectfully request that the rejection be withdrawn and submit that the claims as amended are in condition for allowance.

F. The Dependent Claims

The Office Action also rejected dependent claims 29, 30, 32-33, 35, 37-38. The rejected dependent claims included each and every limitation of the independent claims from which they depend. Because the independent claims, as amended and explained above, are not anticipated by the cited references, the references do not teach each and every limitation of the dependent claims. The Applicants respectfully

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submit that the rejections of the independent claims is now improper, that the claims are now in condition for allowance, and request that the rejections be withdrawn.

III. REJECTIONS UNDER 35 U.S.C. § 103

A. *Baumoel* in view of *Kalinowski*

The Office Action rejected claims 44-46, alternatively, "... [under] *Baumoel* . . . over [*Kalinowski* Figures 8 and 9]. . . ." This rejection is respectfully traversed. *Baumoel* is discussed in Part I.D. above, and *Kalinowski* is discussed in Part I.E. above. The Examiner seems to be asserting that if neither *Baumoel* nor *Kalinowski* fully anticipates the claims, then claims 44-46 are obvious from *Baumoel* in view of *Kalinowski*. For the reasons set forth above, with regard to both references, the combination of *Baumoel* and *Kalinowski* does not teach elements of the claims as amended. Neither teaches the element of an ultrasonic transducer acoustically coupled to both the top surface, parallel to the bottom surface, and at least one side surface. Because neither reference teaches these elements, as discussed with regard to each reference above, the combination cannot teach the elements. The Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness and request, therefore, that the obviousness rejection of *Baumoel* in view of *Kalinowski* be withdrawn.

B. Obviousness Rejection Over *Akiyama*

Claim 31 has been rejected as obvious over the references as applied to claim 29 above and further in view of U.S. Patent No. 4,557,148 to *Akiyama* (*Akiyama*). This rejection is respectfully traversed. Claim 31 depends from claim 29, which depends from independent claim 28. The Office Action at page 5 stated that *Akiyama*

"evidences that it was known to task control of transmit receive functions for ultrasound systems involving refractive or mode conversion blocks to a microprocessor per element 63 of Figure 7."

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Akiyama, however, does not include the limitations of claim 28, namely an ultrasonic transducer, acoustically coupled to the top surface which is parallel to the bottom surface, as discussed above. Therefore, each and every element of claim 31 is not taught by the references as applied to claim 29 above in view of *Akiyama*. For these reasons and the arguments stated above, the Applicants respectfully submit that claim 31 is now in condition for allowance and request that the rejection be withdrawn.

C. Obviousness Rejection Over *Lynnworth*

The Office Action has rejected claim 42 as unpatentable over the references cited for claim 28 further in view of U.S. Patent No. 3,575,050 to *Lynnworth* (*Lynnworth*). Claim 42 depends directly from claim 28. Independent claim 28 is not anticipated as discussed above. The Office Action further stated that claim 42 was unpatentable with regard to *Lynnworth* because,

“since the latter evidences that it was well known that the elastometric materials were suitable for coupling energy out of a mode converter assembly [citations omitted].”

Claim 42, however, not only recites “thermoplastics, elastomers, or combinations thereof[,]” but also recites each and every limitation of the independent claim 28, including “an ultrasonic transducer, acoustically coupled to the top surface which is parallel to the bottom surface.” As has been explained above, claim 28 is not anticipated because each of its elements are not taught by the cited references. The addition of *Lynnworth* as a reference is only directed to the limitation stated in dependent claim 42, and does not cure the deficiencies of the primary references. Therefore, the Applicants respectfully submit that claim 28, as amended, is not obvious over the above references in view of *Lynnworth* and request that the rejection be withdrawn.

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D. Obviousness Rejection Over *Hill*

The Office Action rejected claims 39-43 as unpatentable over the references applied to claim 28 and in further view of U.S. Patent No. 6,065,350 to Hill (*Hill*). Claims 39-42 depend directly from claim 28, and claim 43 depends from claim 42. The Office Action stated that *Hill* taught

“ . . . such mode converters may be used in association with fluid conduit testing such that acoustic impedences as in the silicone transition and velocities used may be akin to those found in the body which is also primarily fluid.”

As explained *supra*, amended claim 28 is not anticipated by the cited references, therefore each element of the amended independent claim from which each of the claims 39-43 depend is not taught; the addition of *Hill* does not cure the deficiencies of the primary references as noted above because *Hill* does not teach an ultrasonic transducer acoustically coupled to the top surface which is parallel to the bottom surface. Moreover, even if *Hill* supplied the deficiencies in the primary reference as discussed above, one of ordinary skill in the art would not have been motivated to combine its teachings with those of the primary references. Specifically, although the human body may be primarily water as the Examiner asserts, its tissues and muscle do not exhibit the characteristics of a fluid, such as taking the shape of its container, flow ability, etc.... Tissue within skin does not correspond to fluid within a pipe, as in *Hill*. One of ordinary skill in the art of treating human tissue *in vivo* would not ordinarily look to the art of measuring fluid flow in a pipe for advice on how to treat living human tissue. Therefore there is no motivation to combine these references because *Hill* teaches a flow measuring system with two separate and independent transducers, not a single converter that includes multiple transducers. The Applicants respectfully request that the rejection of all claims dependent from 28 be withdrawn and submit that claims 39-43 are now in condition for allowance.

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E. *Baumoel* or *Kalinowski* in Further View of *Hill*

The Office Action rejected claims 51-55 as unpatentable over *Baumoel* or *Kalinowski* as applied to claim 44 and further in view of *Hill*, stating

“mode conversion blocks may be used in conjunction with fluid materials having acoustic impedences and velocities similar to tissue whereupon silicone materials may incorporate into the block.”

Claims 51-54 each depend from claim 44, and claim 55 depends from claim 54. Claim 44, as discussed above, has been amended to include limitations not found in *Baumoel* or *Kalinowski*. The inclusion of *Hill* in the rejection does not address the deficiencies discussed above.

In addition, there is no motivation to combine the references as discussed above with regard to *Hill*. The fluids within pipes measured by both *Hill* and *Kalinowski* are not corresponding structures to tissue within skin. The properties are not the same, and no measurements are being taken. The Examiner, therefore, has failed to make a *prima facie* case for combining *Hill* with either *Baumoel* or *Kalinowski* or both. The Applicants, therefore, respectfully request that the rejection be withdrawn and submit that claims 51-55 are now in condition for allowance

F. *Baumoel* in view of *Hill*

The Office Action also rejected claims 61-65 as unpatentable over *Baumoel* as applied to claim 56 and further in view of *Hill* for the same reasons set forth with regard to claims 51-55. Claims 61-65 depend from independent claim 56. For the reasons discussed above with regard to claim 56, the *Baumoel* reference does not address the limitations of claim 56 as amended. Further, *Hill* does not address the deficiencies also discussed above with regard to claims 28 or 51-55. The Applicants respectfully submit, therefore, that claims 61-65 are in condition for allowance and request that the rejection be withdrawn.

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G. *Kalinowski or Baumuel in Further View of Akiyama*

Claims 66-67 have been rejected as being unpatentable over *Kalinowski* or *Baumuel* and further in view of *Akiyama* "as described above." Specifically,

"[the] acoustic transducer-driven mode conversion blocks were heretofore known to be microprocessor controllable since their energization program requires no further processor sophistication to implement."

Claim 66 has been amended to include the limitation of the ultrasound transducer having a top surface which is acoustically coupled with at least one ultrasonic transducer and a bottom surface parallel to the top surface. These limitations, as discussed above with respect to each of the references, are not taught by the cited references or their combination. Therefore, each element of the claims as amended is not taught by the combination, and the rejection should be withdrawn. For these and all reasons stated above, the Applicants respectfully submit that claims 66-67 as amended are in condition for allowance and requests that this rejection be removed.

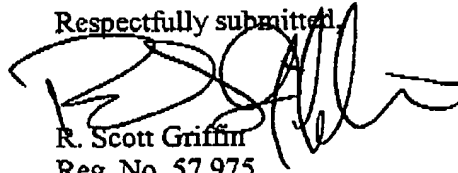
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CONCLUSION

Applicants respectfully submit that claims 1-71 as amended are in condition for immediate allowance, and requests early notification to that effect. If any issues remain to be resolved, the Examiner is respectfully requested to contact the undersigned attorney for the Assignee at 404.745.2434 to arrange for a telephone interview prior to issuance of an Office action.

Respectfully submitted,



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